Midwest Engineer

SERVING THE ENGINEERING PROFESSION

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

ENGINEERS A COMMODITY — PAGE THREE

Vol. 9 MARCH, 1957 No. 10

NPC Die Castings

ALUMINUM
ZINC
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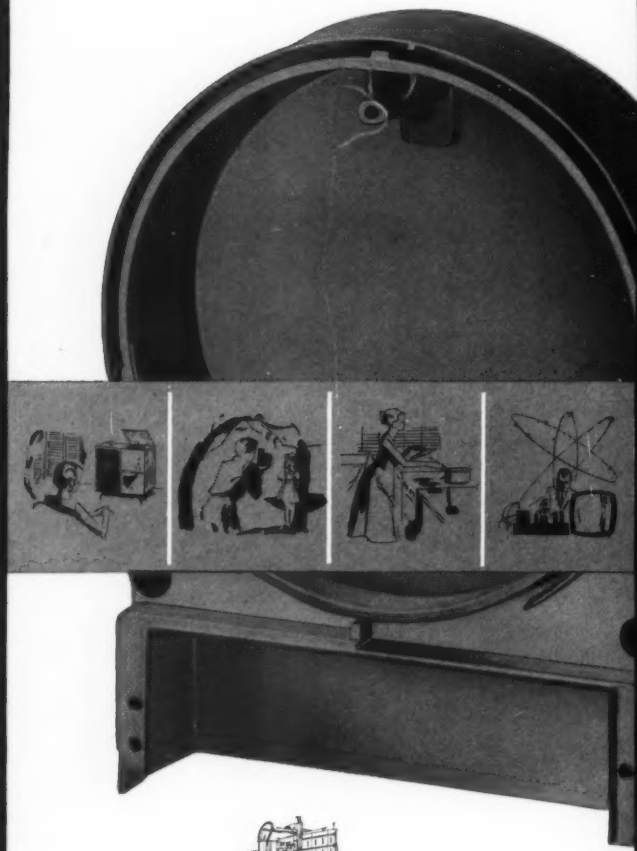

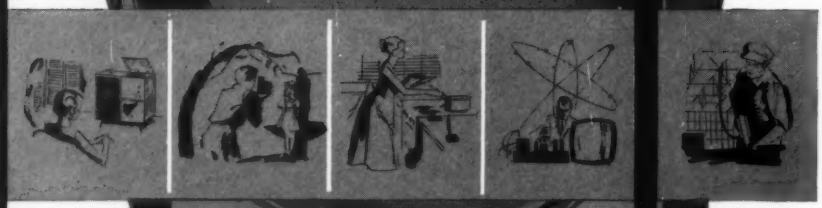

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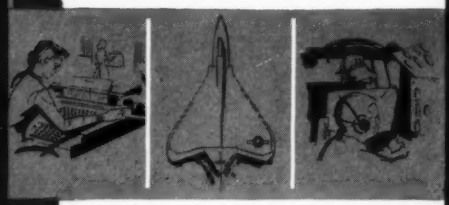

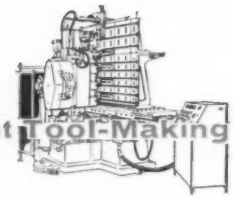

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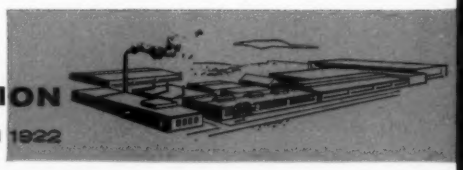

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MIDWEST ENGINEER
Published Monthly
BY
THE WESTERN
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AT
84 EAST RANDOLPH STREET
CHICAGO 1, ILLINOIS

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Single Copy .....$ .50
Annual subscription 4.00
Foreign subscription 6.00

Entered as second-class matter at the post office at Chicago, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

March, 1957 Vol. 9, No. 10

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COVER STORY

Dr. William Mullins of the Westinghouse Research Laboratories illustrates with soap bubbles how atoms group themselves into orderly arrangements, or "crystal structures." Because soap bubbles have a tendency to join and balance in much the same way as atoms do, this "bubble" technique duplicates actual atomic crystal structures, of which all metals are composed. Westinghouse research scientists can thus "see" and investigate on a vastly larger scale the patterns and defect structures formed by atoms in nature. In an actual crystal structure, the space between each atom would be six million times smaller than those shown between the soap bubbles.

—Westinghouse photo

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Engineers A Commodity

By Earl C. Kubicek

Writing in the May, 1956 issue of the *Journal of College Placement*, David Saranoff, distinguished chairman of the Board of the Radio Corporation of America, said in his article, "Technical Manpower":

"In all fields, affecting our national security, Research and Engineering are of surpassing importance. There is no substitute for brains or for the practical training in a technical age. Our safety and industrial strength rest upon our success in expanding our nation's reservoir of physicists and scientists, trained engineers and technicians. Our economy and national security will suffer seriously unless we solve this problem promptly and vigorously. Science and technology are the very hallmarks of American civilization."

You have, unquestionably, heard this refrain, or variations thereof from many sources. What is being done to make possible a sufficient number of scientifically trained personnel? What is being done with the technically trained engineers and scientists in today's industries?

What is being done by business to hold the personnel they already have? What is being done to attract other engineers to business? What about the supply of engineers?

In 1955, according to the most reliable figures available, some 24,000 engineers graduated from accredited engineering colleges and universities in the country. The Engineering Manpower Commission estimated the need for new engineers in both civilian and military projects at between 45,000 and 70,000 in 1955. Enrollment figures indicate that we can anticipate graduating some 28,000 engineers in 1958, 31,000 in 1960 and 35,000 in 1964.

Mr. L. J. Fletcher, vice president of the Caterpillar Tractor Company of Peoria, Illinois, said that last year they were forced to turn down six important research and development projects for the Armed Forces due to shortage of scientifically trained manpower.

Last year the North American Aviation Company was in the market for some 2,000 engineers and the company reported that lack of engineering talent "hampers our development program somewhat."

The Food Machinery and Chemical Corporation of San Jose, California, reported that they're using "lots of pseudo engineers like persons normally draftsmen." They also reported, "We're using more women than ever before plus persons just shy of their engineering degrees plus semi-retired persons who can work part-time."

Another organization, the McDonnell Aircraft Corporation of St. Louis, Mo., says with respect to computing jobs formerly assigned to engineers: "We could use all the girls we can get with mathematics degrees."

Really a Shortage?

Some of these remarks touch upon that query, "Is there really a shortage of engineers or are they being used to their full advantage by industry?"

With a definite slant to their argument the May, 1956 issue of *The Consulting Engineer* said in an editorial: "There may be some question as to whether or not there is an actual shortage of engineers. If all registered or graduate engineers were doing engineering work there would probably be a surplus rather than a shortage. The fact is, however, all of these engineers are not working in engineering."

If engineering were a trade and those practicing engineering at some phase of their professional careers were capable of doing only this work and no other, this statement would have more weight than it has.

If Mr. Hoover (HMWSE), professionally a Civil Engineer, had stayed in his profession rather than using his talents in other areas he would not have been president of the United States.

If Dr. Rettaliata, (MWSE) president of Illinois Tech, had continued in his professional capacity as a Mechanical Engineer, we would have lost his talents as a top administrator and educator.

If Professor Fiesenheiser had stayed in business as an engineer, it would have been the educational world's loss.

Several years ago I made a study of some 3,000 of our alumni, using the five year periods beginning with 1949 and going back to 1929. I found that with a minimum of 52% of any given class reporting, a definite pattern showed up at a period ten years after graduation. The engineers were moving from what might be termed pure engineering into supervisory positions, management or sales. The trend was most pronounced at the 15-year period and there were few engineers, as such, at the 20-year period—they being at this time almost wholly in management or sales. I found no engineers at 25 years. By that time they were owners of their own businesses or in responsible management positions for American industry.

Again referring to the statements made in *Consulting Engineering* we find the claim that engineers can make more money in sales, management positions or non-engineering work than in their chosen profession. It is the conviction of *Consulting Engineering* that if industry would be willing to match the salaries paid engineers with "Sales Engineers" they would find a good sized line outside their business doors on any given morning.

Last year the National Society of Professional Engineers made a comprehensive study with respect to engineers and their place in American industry. This study analyzed their hopes, ambitions and the utilization of their talents. After

Mr. Kubicek, the author of this article, is director of Alumni Relations and Placement, Illinois Institute of Technology.

a "field study" of 1,300 engineers the Society came up with a picture of the "typical engineer."

The Typical Engineer

They found that the "typical engineer" in industry is 35 years of age, has been an engineer for nine years with some time out for military service and has worked for his present employer, a large manufacturing company, for six years.

Other points brought out in the study reveal that our "typical engineer" is one of more than 200 members of the firm's engineering staff, does most of his work in the office but does go out occasionally into the field and supervises five other persons.

Are these "typical engineers" happy in their work? The study showed that 75 per cent planned to shift to other fields in the future if the opportunity presented itself. The most popular field was that of Consulting Engineering with Engineering Administration, General Administration and Sales Engineering following closely behind in that order.

The study also revealed, however, that 87 per cent of those currently in non-technical positions said that they would prefer an assignment with technical engineering responsibilities if the opportunities for advancement and the financial remunerations were commensurate.

Remuneration

Remuneration on the job is not the major factor in job dissatisfaction, we find. The basic complaint is that the engineer is expected to think of himself as a member of the management team, as a professional man, and display definite loyalty towards management. Yet there is little reciprocation on the part of management towards the engineering staff in allowing them to participate in policies or decision for the company.

It may be, therefore, that lack of utilization of the teams' full potentials may be one of the factors aggravating a serious existent problem. It may be that the engineer's assignments are often in the sub-professional category and that he is not being provided with enough supporting help of the technician quality.

In the Committee's study of 500 companies with 3,948 plants throughout the country and with an employment level of some 106,000 engineers they found that, despite the high demand for engineers at a time when most companies were unable to fill their requirement needs, some companies were still using engineering graduates on relatively unimportant jobs which would have been adequately handled by non-professional help. However, they also found that approximately 85 per cent of the companies' engineering staffs were spending three-fourths of their employed time in technical engineering work.

We find that the kind of work, formerly thought of as "engineer's work," such as routine drafting, designing, changes on drawings, collecting and correlating data, calculating, etc., was now being channeled to subordinate personnel leaving the creative work to the men who were educated for this work.

Management Had Its Say

Management has had its say in the matter of engineering utilization in the survey, "How to Attract and Hold Engineering Talent." Eighty-eight per cent of the management executives in this study indicated their engineers had an adequate knowledge of the fundamentals of engineering science. Sixty-two per cent replied that their engineers did not have a proper professional attitude. Eighty-five percent said that they attempt to instill a professional attitude in their engineering staff but 55 per cent did not offer any type of training program to fit the junior engineers for better positions. Sixty per cent did not make any distinction between procedures applying to engineers and non-professional personnel.

The management of 85 per cent of the companies in the study said that they keep their engineers informed of their personal progress as well as of their deficiencies. Ninety-eight per cent said that, when better engineering opportunities occur within their own organizations, they give first choice to their own personnel.

Ninety-two per cent also said that when their companies have openings of a desirable nature in non-engineering fields, the engineering personnel are given a chance to qualify. Ninety-three per cent advised that they grant a reasonable amount of time off without loss of pay to engineering staff members for outside professional activities and 42 per cent indicated that they actually pay the initiation dues in professional societies for their engineers wishing to participate in such activities.

So far as mortality was concerned management felt that the main reasons

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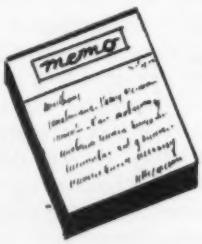

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U.S. 285 between Morrison and Denver, Colorado was built with durable concrete in 1925.

Photo below is Route 7 near New Ashford, Mass., paved with safe concrete in 1929.

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Besides providing unmatched safety, concrete roads offer outstanding economy. That's because concrete pavements are moderate in first cost, cost far less to maintain and last much longer than any other pavement. The result: ***low annual cost.***

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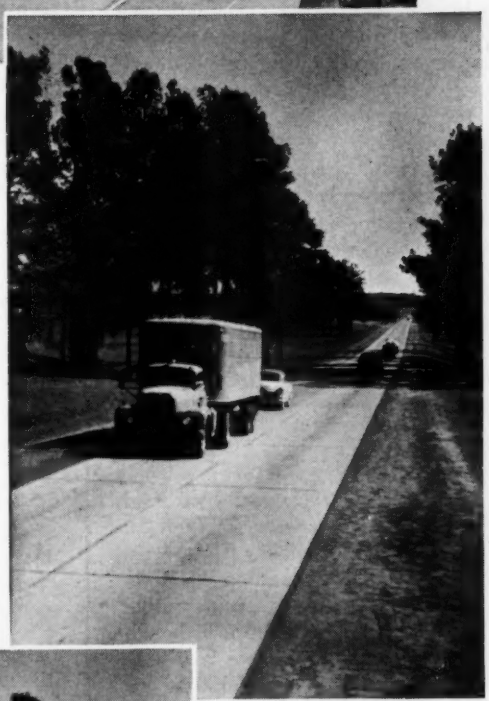

U.S. 80, (above) East of Jackson, Miss., was paved with economical concrete in 1939.

Busy U.S. 30 in Iowa (left) was widened and resurfaced with dependable concrete in 1949.

for engineers leaving their respective companies were: 1. Insufficient salaries (33%); 2. Location of work (14%); 3. Personality clashes (14%); 4. Lack of opportunity for steady advancement (12%); 5. Boredom with routine work (11%); 6. Lack of professional recognition (9%); 7. The feeling of insecurity (7%).

This matter of effective utilization of engineering talent has had its other sidelights in the development of engineering unions in certain areas. Without delving too deeply into this complex and highly controversial subject of unionization, it might be interesting to again review the findings of the survey, "How to Attract and Hold Engineering Talent." Fourteen hundred engineers currently employed in industry were asked the question "Do you believe engineers' interests are strengthened, economically or otherwise, by membership in a collective bargaining organization?" Thirty-four per cent answered in the affirmative and 60 per cent in the negative.

This pilot group, mostly in the younger age bracket — the average age was 35 years — expressing the pro-union opinion were without any actual experience with a labor organization. Only about 6 per cent of this group were employed in plants which had collective bargaining organizations for professional employees and only half that number belonged to unions.

A.S.C.E. Study

The American Society of Civil Engineers, in a study reported in *Civil Engineering* for November, 1953, found in response to their question, "Are you opposed to collective bargaining?", that 63.4 per cent of their membership were opposed and 36.6 per cent were not opposed. The membership of the Society is 17,000, of which 9,000 are under 40 years of age and over 7,500 are non-supervisory employees.

To another question, "Do you consider that collective bargaining is, or would be, advantageous to you?", 25.1 per cent thought that it could be and 74.9 per cent thought otherwise. Of the 25 per cent who thought that collective bargaining would be advantageous, 95.8 per cent favored professional bargaining groups and 4.2 per cent were in favor of a labor union.

We have been talking, for the most part, about the engineer presently employed in American industry. Like the sale of your companies' products or services, you must have the bird in hand before you can tell about the advantages of employment in your organization.

Recruitment

Recruitment at the college level, and particularly in the matter of engineering recruitment, has almost reached the level of fantasy. The separation of fact and fancy is, at times, very narrow. You've possibly heard of the un-named company who lost half of their college recruiters to other companies while out on the road. Then there is the story of the company who offers to hire the entire engineering class, sight unseen.

Each of these stories do have grains of truth in them like the fables of old, but, unfortunately, are often taken as the literal truth rather than the pleasantries they are intended to be. They are intended to provide a chuckle in the frustrating business of recruitment of personnel.

Back in 1949 the Department of Labor, vigorously seconded by a national publication, painted a very gloomy picture of the nation's potential needs for engineering graduates. Some of us were able to recall an earlier day and the sale of apples on street corners. The repercussions of this distorted picture are still with the colleges and industry needing engineering personnel.

The Engineering Manpower Commission figures that the total need for graduate engineers is rising about five times the rate of population growth—at about 9 per cent annually.

The post-war low, insofar as engineering graduates in concerned, was in 1954 and there was approximately a five per cent increase in 1955. Even with these increases there will not be, for some time to come, an appreciable number of engineering graduates available to industry on a long-term training or indoctrination program. Industry now has a partner in the business of recruitment of the young engineering graduate — the Armed Forces. Currently eight out of every ten engineering graduates have not had military service and are subject to call, usually within a year or two after graduation, for a period of some 18 months. Continous service with an employer is out of the question for the graduate through no fault of his.

A Lighter Side

For every dark side to the picture there is a lighter side, however, and national experience is proving that 80 per cent of the engineering graduates, hired at the time of graduation and

(Continued on Page 18)

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Warren Barr thanks you, our Customers! Your loyalty and support makes possible this expansion of "Warren Barr Service"

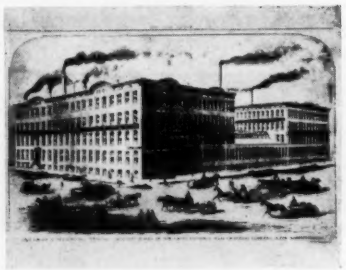
There was sentiment as well as gratitude in the ceremony pictured above. Warren Barr worked for many years in the 175,000 sq. ft. building his company will soon occupy as a Crane Co. wholesaler—and it was here that he began so many lasting friendships.

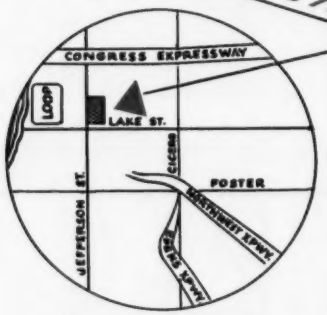
Now he returns to "156 No. Jefferson" with appreciation for your years of loyalty, determined to "supply" the finest service and quality to his plumbing, heating and construction friends of the greater Chicago area.

BUILDING HAS HISTORIC PAST

Richard Teller Crane, founder of the Crane Co., erected in 1865 the building known as the "Chicago Branch." Built as a factory, it once contained most of the company's production facilities. The picture below was rendered around the 1865-70 period.

With the opening of a modern new Chicago area branch in Franklin Park, Crane Co. now turns over the keys of "156 No. Jefferson" to Warren Barr.





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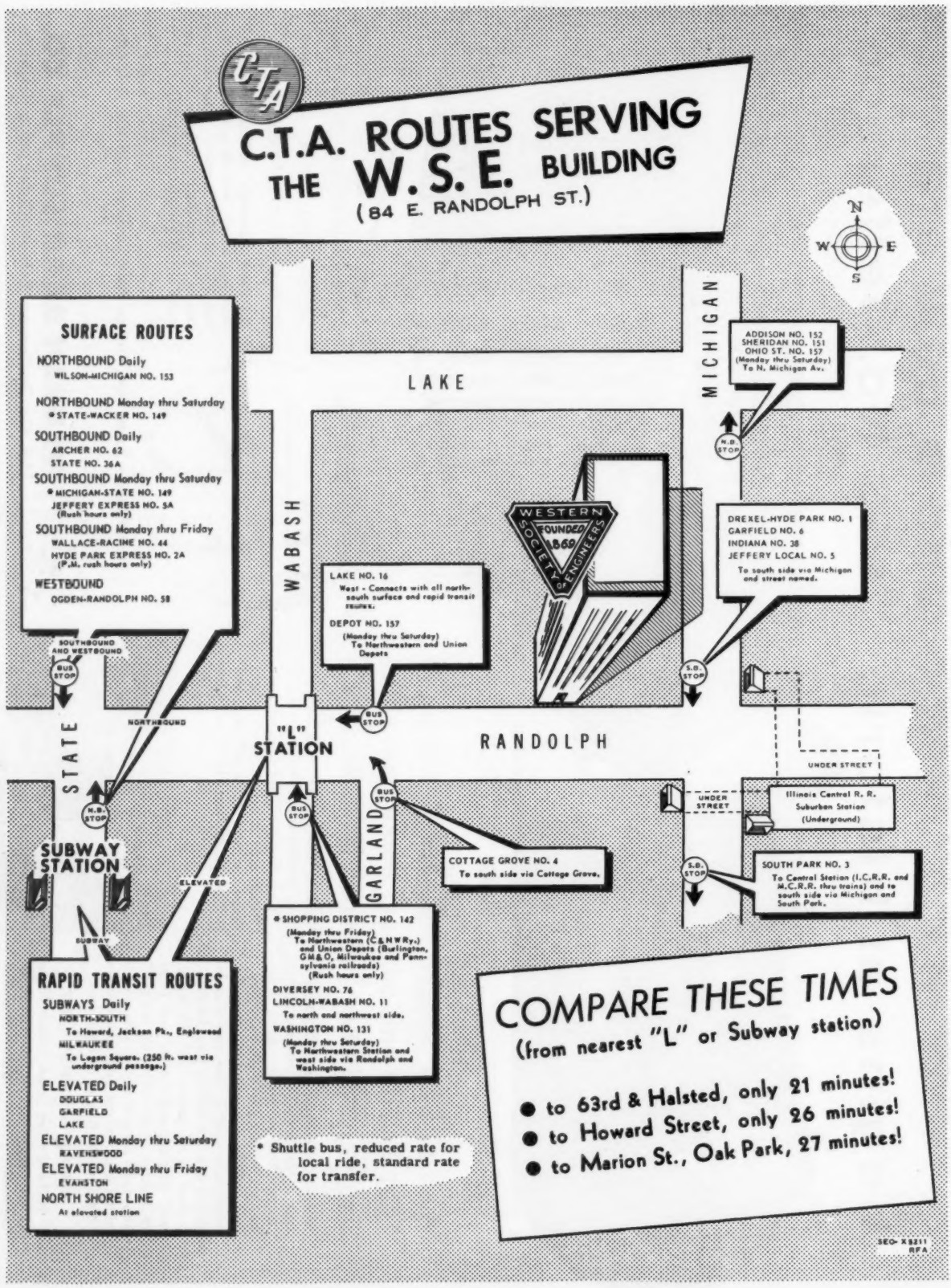
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Auditorium Gets Sound Check-Up

A battery of electronic audio equipment of the Brush Electronics Company has been moved into the Cleveland Public Auditorium to solve the problem of that hall's poor acoustics.

Based on the findings of tests run with this equipment, recommendations to the Cleveland city architect were to be prepared by Dr. Joseph L. Hunter, professor of physics at John Carroll University, and Harold Mull, a member of the acoustic section of the National Advisory Committee on Aeronautics at the Lewis Propulsion Laboratory in Cleveland. Both are sound consultants.

First the team ran a series of articulation tests by placing several persons in various locations throughout the auditorium and reading to them a list of 100 disconnected syllables. The listeners then recorded the syllables they heard, or thought they heard, and their lists were then compared to the master. The results of the articulation tests revealed that the hall fell well below the accepted criteria.

According to the sound experts, the most important test conducted was that of reverberation. This test indicated the length of time required for various sounds to fall off, thus determining whether the sound lingered long enough for its vibrations to become intermingled with later sounds.

These tests were conducted with the aid of a Brush Audio Freqency Spectrometer, a High Speed Level Recorder, a Beat Freqency Oscillator with a Warble Tone Attachment, a Condenser Microphone and an Automatic Reverberation Time Switch.

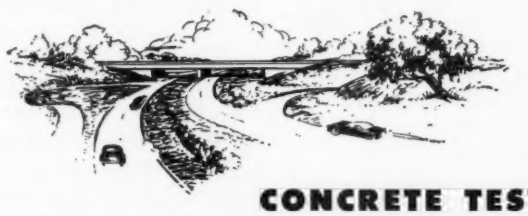
Dr. Hunter indicated that the reverberation problem in the hall was the predominant element in its bad acoustics. Once this problem has been eliminated, it will reduce greatly any other difficulties arising from echo, frequency of response and loudness.

The tests showed that sounds in the frequencies of 125 to 250 cycles per second had a fall-off time of 6½ seconds. It was found that approximately 37,000 square feet of the auditorium's walls, ceiling or floor should be treated acoustically to shorten this extended fall-off-time to acceptable periods. Each area of the wall, ceiling and floor space of the hall was examined to determine what treatment could be applied, and how much of that area was available for treatment. This was necessary since events which are housed in the auditorium are varied and on many occasions the sound does not emanate from the stage. In those events where the center of the hall is the focal point, the reverberation as the sound is repeatedly reflected from the ceiling and floor is such that sound is indistinguishable.

The interior sections to be treated have been listed in the report to the city, which has already begun to act on the recommendations made by Dr. Hunter and Mull. The goal: that the auditorium will reassume its role as an enviable convention and exhibition site.

Reading maketh a full man; conference a ready man; and writing an exact man.

— Sir Frances Bacon



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Where roads, bridges or buildings are under construction, the new, portable CT-711 CONCRETE TESTER is an invaluable aid in saving time, money and materials . . . by bringing laboratory testing precision to all working locations.

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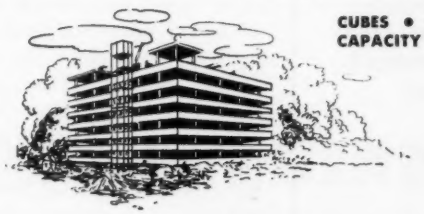

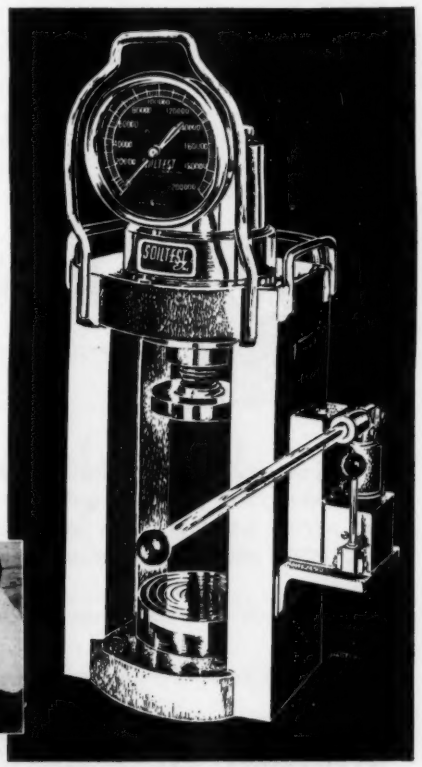

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Student Attitudes are Evaluated

Continuous opportunities to work on worthwhile and stimulating problems within their potential abilities, and possibilities of taking on increased responsibilities are primary considerations of today's graduating electrical engineering students seeking employment.

This was the report of D. S. Babb and M. S. Helm of the University of Illinois, Urbana, Ill., at a conference on ethics during the American Institute of Electrical Engineers' Winter General Meeting in the Hotel Statler. The paper, "Attitudes and Ethical Values of Present-Day Electrical Engineering Students," was an evaluation of a student panel discussion.

The majority of students, the paper pointed out, are not unduly influenced by glittering promises of bonuses, fringe benefits or employee conveniences. "Offers of a bonus for accepting employment," the paper said, "are likely to be rejected. Students are skeptical of such companies and are becoming increasingly wary of those industries that offer traditionally high starting salaries without job security."

Security, the paper said, is not thought of by the student as merely being retained on a company payroll, but is regarded in terms of chances to advance according to ability and to develop professionally and creatively.

Remarks and attitudes of the students, said Messrs. Babb and Helm, also suggest publicity needs about engineering. There are two times in the life of a student, they said, when publicity about engineering is needed. The first is while the student is in elementary and secondary schools and the second while he is in engineering college. For pre-college students, the authors suggested the publicity should be quite general and somewhat glamorous to stimulate a positive interest in engineering, while the college student should be offered information about the type of engineering problems in the various types of companies that employ engineers. Although considerable material of good quality has been prepared by several organizations for use in elementary and secondary schools, publicity is lacking in pointing out engineering opportunities for women, many of whom do not pursue a natural interest in engineering because of a feeling that engineering is strictly a man's field.

Less has been done, said the authors, to provide the type of publicity needed by engineering students to help bridge the gap between academic studies and work in industry. As we see this problem of publicity to engineering students, they continued, answers are required to the following questions:

1. What can be done to best acquaint the student with present-day engineering problems and the part he will play in solving these problems?
2. What can be done to facilitate the student with the needs and work of engineers in companies where the name of the company does not suggest the need?
3. What should company brochures contain to be of most use to the student?
4. What changes should be made in interviewing procedures?
5. What should be the nature of summer employment offered to undergraduate students?
6. What help do the colleges need from industry in order to keep up with rapidly changing developments and their effect on the requirements for new engineering personnel?

Automatic Control Courses are Offered

The University of Michigan, College of Engineering, has announced two summer Intensive Courses in Automatic Control. The first is scheduled for June 17 to 22 inclusive, and the second for June 24 to 26, 1957, inclusive.

The courses are intended for engineers who find it necessary or who wish to obtain a basic understanding of the field, but who cannot spare more than a few days for this purpose. The aim of the courses is to make it easier to learn by a coherent presentation of the fundamentals of modern automatic control and by providing a comprehensive set of notes to serve as a framework for further study.

The courses are built around the principles and application of measurement, communication and control. Course I will consist of the fundamentals in each of these fields and will include some basic work in nonlinear systems. Course II will take up applications of the fundamentals to more advanced problems. There will be four hours of lecture each morning and three hours of laboratory of demonstration in the afternoon. Extensive use will be made of computing, instrumentation and servo laboratories on the campus. The role of analog computing methods will be emphasized. These courses have been given previously in the summers of 1953, 1954, and 1955.

Registration closes Apr. 15.

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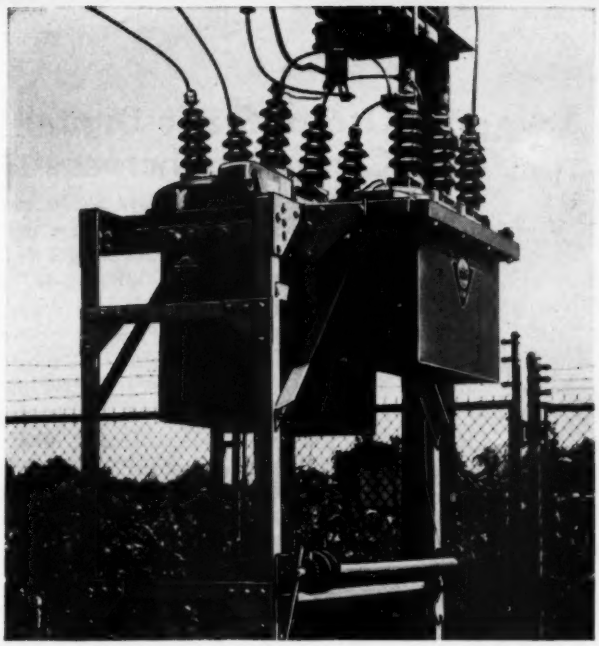

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Reynolds to Make Annual Award

An international award of $25,000 will be made annually by the directors of the Reynolds Metals Company to the architect who has made the "most significant contribution to the use of aluminum, aesthetically or structurally, in the building field."

Establishment of the Award was announced Nov. 11 in New York by Richard S. Reynolds, Jr., president of the company, at a special dinner meeting at the Waldorf-Astoria Hotel and at concurrent occasions in 15 other major cities connected by closed circuit television. The award, a memorial to the late R. S. Reynolds, founder of Reynolds Metals Company, will be known as the R. S. Reynolds Memorial Award.

The 5,000 architects, builders and business men who were guests of the company were told that recipients will be chosen each year by a committee of distinguished architects working under procedures established with the counsel and cooperation of the American Institute of Architects.

Reynolds said that the committee of judges would be named in the near future. Announcements of the award, largest in the architectural field, have been sent to leading architectural societies all over the world.

The R. S. Reynolds Memorial Award will be international in scope. It may be conferred upon an architect of any nationality for work done in any country. "Prime consideration," the announcement said, "will be given to the creative value of the contribution and its potential influence on the architecture of our times rather than to the size or type of structure. Preference will be given to work completed during the 12 months preceding the award but the judges, if they wish to do so, may acknowledge earlier work in selecting award recipients."

"In spite of aluminum's great progress," Reynolds said, "I think there is no question in anyone's mind today that we are only on the threshold of the Age of Aluminum. We have only begun to move out of a period when this strong, light metal has been used largely as a substitute for other materials. It is still relatively unusual to see the unique and amazing qualities of aluminum used as the basic fact in modern engineering and design, letting form follow the dictates of this new material."

Reynolds added: "It is certain that architects, engineers, and builders will increasingly explore these potentialities for structural and surface treatment and that their discoveries will have far-reaching effect on all our building. We hope that the R. S. Reynolds Memorial Award will stimulate, encourage and speed this process."

Reynolds also announced that each year the company will commission an outstanding sculptor to symbolize the award in a piece of original work which will be presented to the winner as an emblem of his achievement.

The directors of Reynolds Metals Company established the R. S. Reynolds Memorial Award "in memory of the late Richard Samuel Reynolds, whose vision, enterprise, and courage made an historic contribution to the creative development of aluminum as a revolutionary new metal in the service of mankind."

Jets Dress Up

Jet fighters are wearing plastic "overcoats" during manufacture to protect their skins from scratches, mars and abrasions at a West Coast aircraft plant, *American Machinist* reports.

Use of Static Digital Control to Increase

The general trend toward higher and higher rates of production, where millions of operations can occur in a few months, will make the advantages of static digital control even more apparent in the future. This was the report on Jan. 24 in New York of H. D. Stuart of Westinghouse Electric Corp., Pittsburgh, Pa., and T. J. Becker of the Michigan Drill Head Co., Detroit, Mich., in a paper presented at the Winter General Meeting of the American Institute of Electrical Engineers in the Hotel Statler. Their paper, "Static Digital Control of a 6-Way Milling and Drilling Machine Tool," was presented during a session on industrial control.

Though relatively new, the paper said, static digital control for machine tool applications already has gained cosiderable acceptance among machine tool users, because of its increased reliability and much longer maintenance-free life.

There is every indication, the paper reported, that the use of static logic elements on production machines will greatly reduce the need for electrical control maintenance. Both experience and theory indicate, it continued, that the operating life of these elements is not determined by the number of switching cycles.

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Polyethylene Power Cables Held Success

Excellent results with high voltage polyethylene power cables have been obtained in the past four years, four Swiss engineers reported Jan. 22 at the Winter Meeting of the American Institute of Electrical Engineers in the Hotel Statler in New York.

Principal advantages of such cables are light weight, freedom from compound migration and ease of installation, observed G. Martin, B. Schmidt, P. Flouck and R. Goldschmidt, of S. A. des Cableries & Tirefileries, Cassonay-Gare, Switzerland. Their paper, titled "Four Years of Experience with High Voltage Polyethylene Power Cables," was delivered by P. J. Croft, Canada Wire & Cable Corp., Toronto.

Total length of these cables delivered by the Swiss Company exceeds 70 miles, they said, adding that the average length is small, as they are commonly used for connection between transformers and overhead lines, or between various pieces of equipment in the station.

Several such cables have been laid on dam construction sites in the Alps. In one instance 1.9 miles of 10 kv cable line feeds a construction project 6,880 feet above sea level, from a transformer station located at 3,935 feet. In another instance, they are used between generators and transformers in a small power station under a river bed, with the transformer 725 feet higher than the generator.

"After four years of experience with polyethylene power cables," they reported, "we are of the opinion that with care it is possible to manufacture good cables and to use them with safety. Their principal advantages are light weight, freedom from migration and ease of installation (small potheads)."

Midwest Research Helps Develop Fuel

Midwest Research Institute of Kansas City, Mo., was one of a number of organizations which participated in the development of a new high energy fuel, Dr. Charles N. Kimball, president, said on Jan. 10.

It was recently announced that Callery Chemical Company, a wholly owned subsidiary of Mine Safety Appliances Company, has been awarded a contract by the Navy to build a $38 million plant near Muskogee, Okla. Since mid-1952 Callery has been conducting investigations—with Midwest Research as a subcontractor—on special high energy chemical compounds as fuels for military applications in missiles and aircraft.

Advanced phases of the research work are continuing.

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Nominating Committee Names WSE Slate

The regularly appointed Nominating Committee of the Western Society of Engineers submitted the following nominations to the Board of Direction at its regular February Meeting. The report of the Nominating Committee was concurred in by the Board.

In accordance with Article X of the Constitution of the Western Society of Engineers, the nominations, hereinafter known as the Regular Ticket are published below; and herewith mailed to all corporate members.

President.....Ormas G. Smith
1st Vice President..William R. Marston
2nd Vice President.Hjamar W. Johnson
Treasurer.....J. T. Rettaliata
Trustees
for three years....Philip L. Coleman
.....C. B. Cox
.....H. R. Olson
.....F. W. Edwards

Boris Woloshin, chairman of the Nominating Committee consisting also of A. P. Boysen, R. G. Fencl, George Krambles, O. P. Luetscher, Jr., H. P. Sedwick, and H. H. Sonderegger, also recommended the following members to serve on the Washington Award Commission for a three-year term:

.....G. L. Jackson
.....Robert S. Hammond

Military Automation Exposition Held

The first Military Automation Exposition was held in New York's Trade Show Building, on March 18-21, scheduled simultaneously with the Institute of Radio Engineers (IRE) Show at the Coliseum.

Exihibitors at the Military Automation Exposition were primarily manufacturers and suppliers of components, subassemblies and manufacturing equipment used by the military or manufactured by prime contractors to military specifications. No classified (secret) items were on display. Military Automation differs from Non-Military Automation in emphasis and in certain standards.

Nearly half of the equipment which was exhibited was electronic at least in part. Instrumentation was emphasized.

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Engineers are Subject of Survey

Although a majority of engineers find their profession more attractive than it was 10 or 15 years ago, there is room for improvement of their relations with management, results of a survey indicate.

A majority of those surveyed said they are given too much routine work, their pay is not high enough in comparison with others of the same or less ability, and they are not kept informed of company policy.

The survey, made by H. L. Rusch and J. R. Goeke of Opinion Research Corporation, Princeton, N. J., and recommended for publication in the January issue of *Electrical Engineering* by the American Institute of Electrical Engineers' Committee on Management, also showed that the vast majority do not need or want a union to represent them. A majority also expressed the opinion that a union or a similar association is not in keeping with the nature of the profession.

"Stripped to the bone," Rusch and Goeke said, "this survey indicates that two things are needed if both engineers and management are to make the most fruitful use of their productive relationship. Management must understand what the engineer expects, and know that his expectations are high. But the engineer must also learn to view his own job as management is forced to see it—in the light of the complex requirements of the entire business which must prosper as an organization if its various members (engineers included) are themselves to grow in stature, be prosperous, and be happy in their work."

The authors' article, "What Engineers Expect From Management," pointed out that the 800 surveyed were in the larger corporations in the country and were representatives of five major industries: aircraft, automobile, electric machinery, petroleum refining and steel.

"These engineers are industry's qualified professional, technical and scientific personnel holding non-managerial positions," they said. "They are well educated and highly articulate, and they know what they expect from management."

Seventy-seven per cent of those surveyed said that engineers are given too much routine work, while 21 per cent held that this was not true and 2 per cent had no opinion. This topped the list of the engineer's spontaneous complaint "that he is forced to fight his way through a jungle of administrative red tape and onerous routine," the article said. "His creative energies and productive drives too often ebb away in the struggle with clerical detail . . . "

Although four out of five engineers surveyed made more than $6,000 annually, which stands fairly high on the national income scale, pay rated their second highest complaint. They did not complain of pay per se, but of pay in relation to amounts received by others of the same or less ability and as a prestige item. Seventy-six per cent said that their pay was not high enough compared with others of the same or less ability. Nineteen answered the question in the negative and five per cent had no opinion.

"Clearly, today's engineer expects management to do some basic recalculating—if only in response to the law of supply and demand," Rusch and Goeke commented, adding that the engineer "is not so intent on making a higher salary per se as he is on gaining the kind of recognition his background qualifications and professional contributions deserve."

Seventy-one per cent of those surveyed said that they disagreed that the individual engineer needs some sort of a union or similar organization to represent him. Seventeen per cent answered in the affirmative and 12 per cent had no opinion. Seventy-six per cent agreed that unions or similar associations were out of keeping with the nature of the engineering profession. Fifteen per cent disagreed and 9 per cent had no opinion.

Moving Sidewalks

Fabric-and-rubber sidewalks that move will see more use in the future, predicts *Textile World*. With four passenger-carrying belts already in operation, other projects, such as passenger-car conveyors to replace shuttle trains and overhead moving sidewalks in downtown shopping centers, are under consideration.

Pack with Care

Wood crating was used for what was probably the largest single packing job in history—the crating of an entire 800-year-old Spanish monastery for the late William Randolph Hearst. To ship the monastery to this country, 10,751 wood crates were required.

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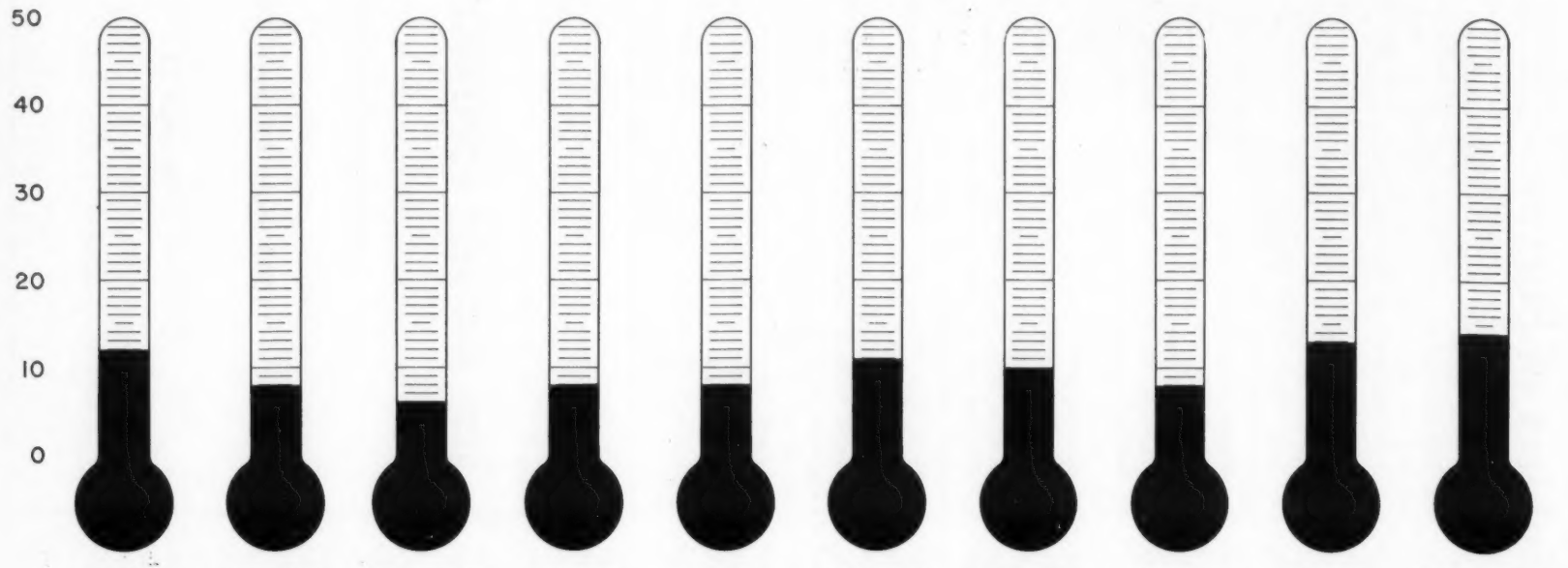

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New Applications (To March 18)

Honor Roll

F. V. Smith

Mr. Smith has attained the Honor Roll by bringing in 5 new members. Keep up the Good Work, Frank! Other members who have signed up at least one new member are:

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N. Dohrn
L. A. Dondanville
A. C. Dunn
G. W. Duwel, Jr.
D. W. Fetters
W. G. Fulton
J. P. Gnaedinger (Two)
W. F. Graf (Two)
C. T. Graves
L. M. Gutgsell
C. Hayden
E. R. Hendrickson
G. M. Henry
P. B. Henry (Two)
F. Heuchling
K. C. Hudson
G. L. Jackson (Two)
C. A. Jaques (Two)
H. W. Johnson
J. F. Koenen
J. Langas
J. E. Linden
P. M. Linscott
F. H. Masters
R. C. Meissner (Two)
R. G. Michael
H. R. Miller
C. A. Monsson
H. S. Morgan
F. Olearnik
H. Penn
M. A. Powills, Jr.
E. H. Pratscher
S. R. Price, Jr.
L. N. Rian
J. R. Roche
J. H. Rohlf (Two)
W. B. Salzman
J. W. Schaefer
J. B. Schaub
V. E. Schlossberg
E. A. Schmidt (Two)
F. M. Scott
R. G. Scott
R. V. Seaholm (Two)
G. W. Serat
A. J. Snider
M. Spiegel
V. E. Staff
R. O. Stauss
D. A. Sullivan
J. F. Sullivan III (Three)
G. I. Uitti
J. Umeda
T. Van Zelst
G. H. Wiemers
R. B. Wight
B. Woloshin

Sincerely,
Jack H. Rohlf
Membership Chairman

Do Your Part—Get Those New Members

Engineers a Commodity

(Continued from Page 6)

prior to their potential induction into the Armed Forces, return to the company after having served. We find that companies are now able to realize that recruitment of all, rather than the few who have served their tour of duty, is not only humanitarian but also practical and just good business.

Five years ago, and we must keep in mind that the potential number of engineering graduates was steadily declining, a survey of 135 well-known companies located throughout the country revealed that they were looking for 3,700 engineers in all categories. They estimated that in the following year, 1952, they expected to look for 4,200 engineering graduates.

By 1952 these firms were looking for 4,900 engineering graduates and they estimated their needs for 1953 to be 5,646. The next year they hoped to find 6,178 engineering graduates and this in the face of the fact that 1954 was the post-war low in the number of engineering graduates available for employment from American colleges and universities.

A Real Wonder

One of the real wonders of the whole picture is that today's engineering graduate is able to maintain anything like equilibrium in the face of the tremendous pressures being built up against him. The senior year in the engineering course is, as we all can realize, a most important one. The potential graduate has to pay close attention to the business at hand — his education. He also has to prepare himself for the end in view — employment in American industry. The colleges and universities have sought to assist their graduates, therefore, in making the best use of their time as well as of their talents by developing placement organizations.

The college placement officer, in charge of a well-organized, well-operated placement office in one of today's colleges, devotes a considerable amount of time and effort in trying to insure that the graduate as well as the company representative, visiting the campus in search of personnel, meet under the most congenial and mutually advantageous conditions.

I don't know whether or not you're personally acquainted with the publication, "The Code of Ethics of Interviewing Procedures", which originally appeared in the *Journal of Engineering Education*, Vol. 39, No. 7, in March, 1949, but a short review of some of the salient points might bear out my earlier statement. This code was, incidentally, the joint effort of industrial and collegiate representatives.

Interview Code

It was noted that among the responsibilities placed upon the student taking personal interviews, were: 1. Adequate preparation for a company interview by the reading of the company literature available in the Placement Office. 2. To attend such meetings as may be arranged for him, by his Placement Office, on behalf of the companies. 3. Not to accept personal interviews with company representatives after he, the student, has signified his intention of accepting employment with a company who has previously visited the campus under the placement recruitment program of the College Placement Office. 4. To use care in the filling out of the company personnel forms. 5. To make his decision regarding employment far enough ahead of the date of graduation so that the company, in turn, can make its plans. 6. To conduct himself in a business-like manner during interviewing.

What were the responsibilities of industry in the matter of college recruiting? Among the points outlined were: 1. The responsibility of industry in contacting the College Placement Office early in the fall of the year preceding the establishment of interviewing schedules. 2. Notification of students, at least two weeks following the date of personal interviews, as to whether or not they are acceptable for employment with the company. 3. The company to provide an adequate amount of literature for the use of potential interviewees. 4. A regular program of personal interviewing during the "lean" as well as the "fat" years.

This last point, which can also be called "consistency" is something that industry learned the hard way. We have known that there are few organizations who do not regularly introduce new employees into their organizations. The matter of personal interviews, through college placement offices, is being recognized as vital to a well-run business whether it be an industrial giant employing thousands of professionally trained personnel annually or its smaller "kissin' cousin" looking for one or two persons per year.

It has always seemed odd to me, coming as I do from industry, to find organizations who would not think of keeping their sales forces from making calls, but keeping their personnel or

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college recruiting organizations from making college contacts during the periods when they feel they should contract, the "soft" periods.

This matter of consistency of recruiting is just a matter of common sense. What has been built up in the way of "customer knowledge" — the knowledge of the company by the graduates — can be easily dissipated by time intervals between interviewing schedules. "Skip" interviewing, as we know it, is one of the most foolish forms of effecting dollar savings.

How does a company determine the number of college graduates to be recruited in any given year? Well, there are many formulas applied to this question and may be predicated upon such answers as were given us. "The quota set depends upon budgetry considerations," or, "We consider the rate of retirement," or, "Determined by the growth of the company," or, "A fixed number is recruited each year," or finally, "The quota is a percentage of the total payroll."

On the subject of actual recruitment on the college campus, Mr. Richard S. Chrbrock of the Proctor & Gamble Company, writing in *Chemical and Engineering News* recently said in his article, "Interviewing the College Graduate," that the initial interview is a "get-acquainted session." This meeting between the graduate and the company representative is, in general, a way for the company representative to get the basic facts and impressions which will enable him to decide whether or not to take the interview to the second stage —that of a company or plant visit, now the usual thing to be done.

Mr. Chrbrock made one observation in his article which can be confirmed by any College Placement Officer in the country when he said, "The college recruiter represents his company on the campus." A little thought will suggest many reasons why it is important to pick the "right" company representative. He must be able to talk the language of the college officers and the college students.

To the graduates the company representative "is" the company. To a considerable extent the first impression of the company is gained by them through the person of its representative. The representative must know his company as intimately as possible and the activities of the division or several departments for which he is recruiting.

His judgement in screeing the graduates and his ability in interesting the student most likely will have more than a little to do with his companies' future. If he is empowered to hire, as sometimes is the case, his position assumes even more importance.

An interview with the vice-president might impress the college graduate, but the vice-president is not always the right person to talk to the potential graduates. Some companies use ex-trainees, others use alumni of the college being visited and the greater percentage nowadays use engineers of the firm in the field of engineering recruitment if these engineers have the personality factors that company would like to have in those they are trying to employ.

The average college campus interview is short, 15, 20 minutes, a half-hour in length. It should always be supplemented by well-prepared literature on the company and its products. The senior cannot always remember all the questions that he would like to ask, hence well-prepared company literature can fill the gaps. The senior, in reading the company literature, is often able to get an overall view of the organization not always gained in a short personal interview.

Types of Literature

There are, in general, two types of company literature currently available. One is the comprehensive type such as catalogues, annual reports, company magazines and literature emphasizing the company's products, locations, etc.

Then there is the type of company literature geared especially to college recruiting describing some of the factors covered in the first mentioned types but also dealing with the intangibles such as what a job with the particular firm will mean to the young college graduate — a trend in looking at the company through the eyes of a young applicant.

We know the obvious — that in times of full employment, the individual engineering graduate becomes highly selective in the matter of employment opportunities. This is true of today's engineering graduate and will continue to be true for some time to come. The graduate knows that there is a strong demand for the services of his colleagues and himself but, discounting the individuals who will take advantage of the situation, it is our experience that the engineering graduate will take a healthy, sober view of the situation and conduct himself accordingly.

The engineering graduate will have several offers of employment prior to

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graduation. Organizations with active college recruitment programs will fill, at least part, of their needs. The companies without active programs but depending upon voluntary applications will find themselves — as they have already — in the position of not getting enough qualified personnel to continue in a competitive position with respect to technical and executive positions.

Each graduate taking a personal interview is entitled to a courteous reception on the part of the company representative for he, in turn, has been schooled by his placement officer in the amenities of good business practices. It is just good business, on the part of the company to place itself in the most favorable light for, even though the company representative may not wish to extend the privilege of employment to each and every graduate he may see, courteous treatment of those he may reject can cause them to become "ambassadors of good will" for the company on campus. This can pay dividends for the company on future interview schedules.

Industry Criteria

What are the criteria usually employed in college recruitment by industry. They probably fall into a pattern, such as: 1. The interviewee makes a favorable impression. 2. Has energy. 3. Is mentally alert. 4. Is interested in the work being offered. 5. Is emotionally mature. 6. Presents evidence of good judgment in discussing past activities and future plans. 7. Has a growth potential insofar as the company is concerned. These are factors equally applicable to the modest sized company in search of employees as well as the industrial giants.

In Summation

In summation there are probably three qualities that stand out when industry is seeking personnel at the collegiate level; personality, character and intellectual quality. For most manufacturing as well as non-manufacturing companes, character, stands first and foremost. A composite picture will place character first with intellectual qualities and personality following closely behind. Attitude ranks fourth, physical condition fifth, and then appearance.

It is understood that these qualities can take a different position dependent upon the needs and type of company position. Appearance is, as an example, more important for a sales engineer than it is for a physicist.

How has the college prepared the young engineering graduate for a place in American industry? They have tried to make him fully cognizant of at least three important points: 1. That he recognize the relation of the theory that he has learned in the classroom and the laboratory to the solution of the practical problems that he will meet in business, and he must master the methods of using theory in the handling of such problems. 2. He must appreciate the complexity of the economic factors that play such a dominant part in the problems of industry. 3. He must understand the character, complexity, and importance of human relationships involved in industry and know how to cope with them.

This is a rather large order to be accomplished in the rather short time alloted to an engineering education. However, today's engineering colleges are intimately and effectively aligned with industry and many are doing just this. They are trying to provide the young engineer with something akin to the clinical and hospital internship of the young physician through such programs of part-time, summer and cooperative educational program none of which will, in themselves, answer all the questions but will, in their cumulative effect, assist materially.

Few companies expect their new recruits to become immediately productive. The cost to the individual company to train the engineering graduate cannot, with any degree of certainty, be measured by a known yardstick. It's really a matter of bookkeeping.

Some companies estimate spending from $5,000 to $8,000 on a graduate engineer before he becomes productive. How they can arrive at such figures is rather hard to comprehend. What is productivity?

The engineering college has sought to implant in the young graduate the seed, the desire, to obtain more education after leaving college. It has not and never will be possible to give a person all the things that all people believe should be in any given program. The engineering educators, through long experience, are much more capable of providing a well-rounded program than anyone else and industry recognizes this.

Writing in the *New York Professional Engineer* a year or so back, Mr. Ronald S. Smith, vice-president of the M. W. Kellogg Company of New York, said in part: "Industry and education must now bear the joint responsibility, for the furtherance of the engineering profession as a whole . . . It is up to industry, however, to provide the additional incentive that makes the concept (meaning that a professional man's education is never ended) realistic from the moment the graduate enters the organization. Industry has generally adopted the indoctrination programs and cadet courses as a means of introducing the graduate into its midst."

Companies following this doctrine will be found to be the most successful in their recruitment programs for we ask each graduating senior at Illinois Tech that $64,000 question at the time he graduates, namely, "Why did you accept this particular position with this particular company?" Placing, as we

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do some 78 per cent at least of any given class, we are able to get some sound statistics.

Motivating Reason

As you can well imagine we get a variety of answers but the majority of any given class have placed "Type of Work" as the motivating reason for accepting a postion with the company. Following this we have found that "Previous Affiliation" is the second reason. This will include summer, part-time, family affiliation with the particular company, location of the company, etc. Salary and location vie for third and fourth place on the "hit parade." True, salary is important. Employment will not be acceptable irregardless of the salary offering but it definitely is not the prime reason for accepting employment as is so often thought.

We are all acquainted with salary offerings that appear in the newspapers and like mediums which seem to indicate that if you are not earning a salary in the five-figure bracket you've no ambition or are not aware of the magnificient opportunities the A.B.C. company can offer you to leave your present employer.

In 1956, the average starting salary of all of our graduating engineers, in all categories, in all types of businesses and employed in all parts of the country, was $391 per month. This is based upon a 40-hour work week with not more than one year's experience based upon part time, summer, or perhaps some work experience prior to college or during undergraduate years. The average in 1955 was $383 per month. In 1951 the average was $295.

Explanation in Order

Like all studies, an explanation is in order so that we may more readily understand all the implications. While the overall 1956 average was $391 per month, we had department averages in June, 1956 of as high as $461. This was in the department of Electrical Engineering and the great rise in electronics may account for some of this. Other June, 1956 averages were: Chemical Engineering, $424.00; Civil Engineering, $434.00, and Mechanical Engineering $426.00 per month. This year we arranged for 2,425 personal interviews between the graduates of our Classes of January and June, 1956, and the visiting representatives of industry. All personal interviewing is arranged through our office as no placement is handled through any department of the college on campus.

While we do not place a ceiling on the number of personal interviews that any individual graduate may take during his senior year, we are able to point out to him that between 6 and 8 interviews should be sufficient and, interestingly enough, this advice is followed by the graduates. The Class of June, 1956, took an average of 7½ interviews per person.

If we chose to include, in our published averages of salaries for our graduates the salaries of graduates having more than one year's experience, we could, without any difficulty, give you an average which would preclude your ever hiring a young engineer. And this would be the last thing we would wish to do for our main purpose in being, at Illinois Tech, is to be of the utmost service to our graduates, our alumni and American industry. Through the matter of organized placement we will be able to accomplish one of the main purposes for which the college was founded.

In Unity . . .

It is an old cliche that "In Unity There is Strength," but events of the past eight or ten years since the war have proven that American industry and American education must join forces to see that those young persons, adequately prepared and sincerely motivated, are able to gain the advantages of higher education.

I call your attention to the fact that those wishing to go on for an engineering or science education in a college or university must be adequately prepared, for it is of little purpose to have a high mortality rate. The public institute, has by law, to accept those with the minimum preparation but the private institution such as Illinois Tech, continues to maintain the highest of standards so that you, the potential employer, will, along with the graduate, benefit from the best educational progress possible.

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Rettaliata Emphasizes Incentives

Greater emphasis on incentives is needed to encourage creativity if the United States is to meet the challenge of an expanding economy.

Dr. John T. Rettaliata, MWSE, president of Illinois Institute of Technology, expressed this opinion in his annual report to the IIT board of trustees for 1956.

"Since the creative individual is a vital link to the dynamic society predicted for the future, he should be cultivated, encouraged, and permitted to work in a climate compatible with intellectual proficness," Rettaliata said.

He pointed out that individuals and organizations are most productive when there is a stimulus to research and invention.

Rettaliata said there currently are several deterrents to the expenditure of extra effort on the part of individuals and corporations. He cited these as:

—The income tax level.

—The recent implementation of commercial restraints.

—The use of patents as a regulatory mechanism.

"When companies, through ingenuity and industriousness, have established leadership in some area," Rettaliata said, "it would not appear justified that they be penalized for such efforts."

Rettaliata also called for greater emphasis upon research, particularly fundamental research.

About 90 per cent of all the research being performed is of the applied type, he said. This kind of research has benefited the nation, but at the same time it has jeopardized the nation's potential for further achievement by depleting the stockpile of existing knowledge.

"We have been living off the fat of prior discovery," he declared.

"Without continued activity in fundamental research," he added, "the inventory of knowledge that applied research feeds on would be used up and the production of applied research would cease."

In his report on the Institute, Rettaliata said IIT completed the academic year ending Aug. 31, 1956 with a record consolidated income of $17.6 million—an increase of nearly $2 million.

The income included $12.4 million in research volume, about $1.6 million more than in 1954-55.

One of the principal reasons for Illinois Tech's improved financial position was a substantial rise in contributions, he pointed out. Contributions totaled more than $2 million—double the amount previously received in any one year.

Rettaliata warned, however, that "the needs of the Institute continue to outpace income. If the Institute is to continue to fulfill its mission it must continue its search for additional funds."

The Illinois Tech president reported IIT experienced another increase in enrollment during the 1955-56 academic year.

The fall semester day undergraduate enrollment was 14.7 per cent higher than for the preceding September, and the spring semester total was up 7.3 per cent.

Daytime graduate enrollment gained 9.8 per cent for the first semester, and 18.8 per cent for the second semester. Evening Division enrollment showed a slight decline for the fall term but had an increase of 10.6 for the second semester.

Two major buildings—Crown Hall, which houses the departments of architecture and city planning and the Institute of Design, and the Physics and Electrical Engineering Research Building, were completed during the year.

Ground was broken during the year for the third building of the Association of American Railroads and a new building to house the electrical engineering and physics academic departments. Plans also were authorized for a $800,000 addition to the Metals Research Building and a $650,000 extension of the heating plant.

Total assets of the Institute increased nearly $3.5 million to approximately $33.5 million, another new high for the Institute, Rettaliata said.

ASTE Celebrates Its Year of Silver

A special motto and symbol have been adopted by the American Society of Tool Engineers for use in 1957 during its Silver Anniversary year. The society is marking its 25th year this month, March 23-28 in Houston, Texas—site of the Silver Anniversary annual meeting this year.

The symbol is designed in the familiar ASTE shape. The border bears ASTE's name in reverse lettering, while the inner area contains the ASTE trademark and the anniversary dates. In the lower inner portion there is a silhouette containing an "all-seeing" eye.

This silhouette is symbolic of the tool engineers' creative manufacturing ability and is directly related to the newly adopted motto: "A Better Life Through Creative Manufacturing."

In announcing the anniversary motto and symbol, Harry E. Conrad, ASTE executive secretary said, "It is the tool engineers' inherent creative talents which are primarily responsible for the rapid continuing improvements in mass-production manufacturing methods. These are in turn passed on to the consumer in the form of more and better goods at less cost. This is our American Way-of-Life to which the tool engineer is a prime contributor."

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Reviews of Technical Books

Transistor Theory

An Introduction to Junction Transistor Theory, by R. D. Middlebrook, John Wiley & Sons, Inc., New York 16, N. Y. 1957. 296 pages. Price $8.50.

This book effects a bridge between the physical processes in semiconductors and the circuit properties of a junction transistor, the areas of physicist and engineer respectively.

The author's starting point is a qualitative discussion of crystal structure and the motion of electrons in crystals. The quantitative treatment is begun with the assumption of two results of statistical and quantum mechanics. Upon this foundation a continuous development of the basic theory of transistor action is presented, leading to a circuit representation of the small-signal performance of the transistor. This is based on physical principles that can be applied without reference to the underlying theory. As the book progresses, the treatment is gradually channeled toward the development of a practical high-frequency equivalent circuit for a junction transistor.

Dr. Middlebrook has organized his material into three major sections. Part I covers qualitative development of junction transistor theory; qualitative and quantitative semiconductor physics; current flow in semiconductors; and boundary values for a forward-biased p-n junction. In part II, the author deals with the p-n junction under applied d-c potential; the p-n-p transistor; internal capacitance, high-frequency and feedback effects; the generalized solution of the p-n-p transistor; *approximations for the diffusion admittances; and the complete small-signal a-c equivalent circuit.

The final part goes into *a modified a-c equivalent circuit for practical applications; and some modifications to the basic theory of the junction transistor. The two starred chapter headings represent Dr. Middlebrook's original work and thinking on this subject. The entire last section, rather unorthodox in approach, rests primarily on the assumption that compromise is inevitable between theoretical accuracy and ease of practical application. The new practical equivalent circuit presented here represents the small-signal behavior of a junction transistor over its useful frequency range as an amplifier.

Dr. Middlebrook is assistant professor of electrical engineering at the California Institute of Technology.

Architectural Graphic

Architectural Graphic Standards, by Charles G. Ramsey and Harold R. Sleeper, John Wiley & Sons, New York 16, N. Y. 1956, fifth edition. Price $18.50.

Earlier editions have been referred to as "grand nourishing stuff," and "the most thumbed book in any architectural office . . . a welcome addition to the profession's tool box."

Architectural Graphic Standards, of course, consists entirely of illustrations, marked by thorough notations. Out of this vast array, 236 plates have been revised for the fifth edition and 286 new plates added. Every page of the previous edition was analyzed and checked, and each one in the completed volume sent out for review to leading trade associations and manufacturers.

Finally, a total reorganization results in twenty-three major groupings, with the table of contents now reading as follows: footings, foundations and retaining walls; wood construction; steel and concrete construction; masonry construction; fireplaces and chimneys; waterproofing and expansion joints; exterior wall facings and veneers; curtain walls; roofing and sheet metal; stairs; miscellaneous metals; doors, bucks, windows and equipment; glass, glazing and glass block; hardware; furring, lathing and plastering; interior finishes; furniture, accessories, equipment and storage; toilet fixtures, accessories and partitions; mechanical equipment and related technical information; landscaping and site work; sports and games; general information; and area requirements for planning. A variety of topics that appeared in preceding editions have been rerouted to more practicable spots in Mr. Sleeper's "Building Planning and Design Standards."

The Ramsey and Sleeper team combines top-flight talent in architectural circles. Charles G. Ramsey was for many years supervising architect for the Village of Munsey Park, and later its architectural consultant. His experience has included work with Joseph Bodker, Trowbridge and Ackerman, Frederick L. Ackerman, and an active private practice. Harold R. Sleeper, a prolific writer and respected practitioner, is also the author of *Architectural Specifications* and co-author with Catharine Sleeper of *The House for You*.

Analysis of Structures

The Analysis of Structures, by Nicholas J. Hoff, John Wiley & Sons, New York 16, N. Y. 1956. Price $9.50. The book is based on the minimal principles and the principle of virtual displacements.

Dr. Hoff's leading purpose is to present structural analysis as a logical and unified theory, based on a small number of first assumptions. For this reason, he chooses as his starting point the principle of virtual displacements which he describes as "probably the most powerful tool of structural analysis." A development of the minimal principles of structural theory, and a thorough exposition of buckling phenomena are the author's next major aims, while a final section of his volume deals with complementary energy and least-work methods. This unified treatment of structural problems and methods although presented from an advanced standpoint, requires a minimum of knowledge in structures, mechanics, or mathematics. As the author points out, the various methods used by structural engineers are all logically interconnected. Once the principles are understood, every method is an almost obvious consequence, and can be derived without memorizing formulas or other mathematical manipulation.

Unusual Broadcast Marks Milestone

In commemoration of its Silver Anniversary, the 36,000-member American Society of Tool Engineers announced its plans for a huge hour-long closed circuit audio broadcast. The broadcast was to be the largest of the closed circuity type ever attempted, according to an American Telephone and Telegraph spokesman.

It emanated from Houston, Texas on the evening of March 25 as a part of the Anniversary Banquet Program, and it was fed simultaneously to 143 ASTE Chapters in as many cities across the nation and in Canada. The event climaxed the week-long 25th Annual ASTE Conference and Anniversary Celebration beginning March 23, at the Shamrock-Hilton Hotel in Houston.

Broadcast time had been divided into four segments totaling approximately 50 minutes, each devoted to expanding the ASTE Anniversary theme, "A Better Life Through Creative Manufacturing." The introductory segment included: a discussion of the purpose of technical societies and their significance from the standpoint of service to industry, education and the American public; the importance of tool engineering to our American economic system; and, finally, the tool engineer as a key figure in promoting the American goal of increasingly higher living standards for everybody, through the manufacture of greater quality products available to more people at minimum prices.

The second segment presented a chronological history of ASTE. There was then a salute to each chapter individually as its year of charter was discussed, building to a climactic tableau of ASTE as it is today. Famous current and technical events were also woven in.

Participating in the third segment of the program, were some of the country's foremost industrial leaders, statesmen, military dignitaries, education authorities, economists, association and society leaders, outstanding entertainers and women of achievement. Each salutation expanded the entire philosophy of tool engineering—what it is—what it does—its need in industry.

The final portion of the broadcast included an on-the-spot chartering of the Society's first foreign "off shore" Chapter in Sydney, Australia; an announcement of the six winners of the ASTE National Honor Awards presented annually for outstanding achievement in tool and manufacturing engineering and the simultaneous installation of over 1100 Chapter and National Officers and Directors. The program was closed with an inspiring message from Howard C. McMillen, ASTE National President, 1956, who, in the same spirit which motived its Founders, rededicated the Society to the American standard of "A Better Life Through Creative Manufacturing."

Pipeline Pipe Dream?

Could the pipeline movement of petro-chemicals divert the location of some future plants of this type from the Gulf Coast to the Midwest?

It's possible, concludes William T. Kopp, Midwest Research Institute economist, who is conducting an extensive study of transportation as a factor in industrial development.

There's no chance of shifting the center of gravity from the Texas-Louisiana area, with its cheap water transportation and other natural advantages, Kopp conceded. But he believes that the Kansas-Oklahoma producing and refining area has the potential for at least $50-$75 million—under certain conditions, up to $300 million—in additional petrochemical investment.

"The natural-gasoline plants and oil refineries in Kansas, Oklahoma, and north Texas are capable of large-scale production of a number of first and second-tier petrochemicals if the cost of transportation can be held down so that a volume market could be reached."

Gold Architectural Finish Is Developed

The first ceramic gold 22 carat finish for architectural use has been developed by The Bettinger Corporation of Waltham, Mass., it was announced Jan. 21 by Nathaniel Cannistraro, assistant sales manager of the company. The gold, fused into the surface of the ceramic, is permanent.

This opens the way for the widespread use of gold finishes in curtain wall construction, now popular for larger buildings. In the past it was felt that genuine gold finishes were far too expensive. But now by the very thin application fusing method 22 carat gold finishes can be produced that are competitive in price with other finishes.

Cannistraro said that the new development was the result of basic ceramic research conducted by his company in cooperation with Hanovia Chemical & Mfg. Co., manufacturers of the gold powders, on behalf of the Jenny Manufacturing Company of Boston. The Jenny company wanted Bettinger to produce a gold ceramic finish suitable for gasoline pumps. The gold pumps were to promote Jenny's new line of golden grade gasoline.

"We use 22 carat gold dust in solution in the finish," Cannistraro said. "The low cost results from our newly discovered method of using a thin application of gold to obtain the finish. Because the ceramic application makes the finish more stable than the gold itself, it does not need to be a thick application."

The Bettinger Corp. is a leading producer of porcelain enamel architectural panels, ceramic-on-steel wall tiles.

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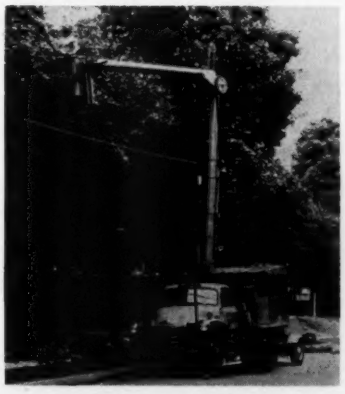

News of Engineers

An associate professor at Illinois Institute of Technology, Chicago, was honored by the American Institute of Metallurgical Engineers for his contribution to metallurgical science.

Dr. Paul Gordon was awarded the Mathewson Gold Medal for 1957 for his paper "A Microcalometric Investigation of Recrystallization in Copper."

The award is given each year for the technical paper deemed the best contribution to metallurgical science published in the AIME's Journal of Metals. It was presented at the Institute's annual meeting in New Orleans Feb. 24-28.

Gordon performed the research leading to his article while a staff member at the University of Chicago Institute of Metals. He has continued research in the same field at Illinois Tech.

Prior to coming to Illinois Tech in 1948, Gordon was a metallurgical group leader on the Manhattan Project at Massachusetts Institute of Technology. He received his bachelor's, master's, and doctor's degrees from MIT, where he also worked as a research associate.

In 1951 Gordon joined the faculty of University of Chicago, then returned to Illinois Tech in 1954 as an associate professor.

* * *

The Portland Cement Association has announced organization changes affecting five members of its Promotion Division, under the supervision of James D. Piper, vice president for promotion.

Martin A. Lewis, assistant to the vice president for promotion, has been named to the additional post of Coordinator of Interstate Highway Promotion. In this capacity he is guiding the Association's program for promotion of concrete paving and structures on the National System of Interstate and Defense Highways. Assisting on technical aspects of this program, Homer A. Humphrey, who was named senior highway consultant. Humphrey was formerly manager of the Association's personnel training classes, a position now assumed by Warren G. Burres, formerly of the Association's Structural and Railways Bureau.

Leo H. Corning, formerly director of Promotion Planning and Engineering Services, has been named to the newly created position of chief consulting structural engineer. His previous post was assumed by George H. Paris, who has heretofore served as assistant to the vice president for promotion.

Lewis joined the Portland Cement Association in 1934 and served with its district offices in St. Louis, Washington, D.C., and Chicago before his appointment as assistant to the vice president for promotion in 1953. Prior to joining the Association, he was with the Missouri State Highway and Parks Departments and the National Reemployment Service.

Humphrey, the new Senior Highway Consultant, is a graduate of Michigan College of Mining and Technology, where he subsequently taught courses on highway subjects for eight years.

Welcome All ye Engineers

Each Friday the combined Transportation and Traffic & City Planning Sections sponsor an informal round-table noon luncheon. The dining room facilities of WSE Headquarters at 84 E. Randolph are made available for these luncheons where genial fellow-ship is the keynote.

Why not take advantage of the opportunity to meet this jovial group? You will be welcomed and assured an enjoyable luncheon in this atmosphere of warm friendliness. These Friday noon round-table luncheons are open to members and guests. Come expecting a good time — you won't be disappointed!

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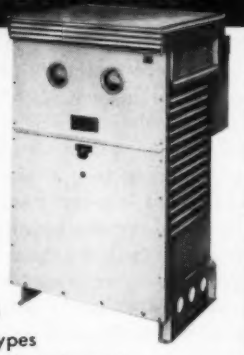

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Joining the Portland Cement Association in 1937, he served as an engineer in the field of soil-cement and highway research. During World War II he spent three years with the Army Corps of Engineers. In 1952 he was made manager of the Association's Personnel Training program.

Burres, who succeeds Humphrey in the personnel training post, is a civil engineering graduate of Purdue University. During World War II he served as an artillery captain in Europe, and is at present a major in the Army Reserve. After four years as structural designer with the Chicago, Milwaukee, St. Paul and Pacific Railroad, Burres joined the Portland Cement Association in 1952 as a member of the Structural and Railways Bureau. In this capacity he has conducted short courses for engineers and contractors and has assisted as an instructor in the Personnel Training program.

Corning, now chief consulting structural engineer, has been with the Association since 1929. In 1935 he was appointed assistant manager and in 1949 manager of its Structural and Railways Bureau.

He received the appointment of director of promotion in 1952 and of director of Promotion Planning and Engineering Services in 1956. Corning is a registered architect and professional engineer and a member of numerous technical organizations including the American Society of Civil Engineers, the American Concrete Institute, and the International Association for Bridge and Structural Engineering. In his new position, Corning will serve as the Association's leading authority in the field of structural engineering and as senior adviser in other fields of engineering. He also will guide the Association's relationships with educational institutions on matters of concrete technology and engineering training.

George H. Paris, the new director of Promotion Planning and Engineering Services, is a graduate of the University of Illinois, with a bachelor of science degree in civil engineering. Prior to joining the Association in 1946, he was a design engineer in the bridge department of the Burlington railroad and later an associate editor with the Simmons-Boardman railroad publications. In 1953 he was appointed assistant director of promotion of the Association, and in 1956 assistant to the vice-president for promotion. In his new post, Paris is directing the activities of six promotion bureaus and the Personnel Training Program.

* * *

Promotion of five faculty members to the rank of associate professor at Illinois Institute of Technology, Chicago, has been announced by President John T. Rettaliata, MWSE.

Those advanced are Dr. Gerald Berman, mathematics; Daniel Brenner, architecture; Kenneth P. Milbradt, civil engineering; Dr. Raimond A. Struble, mathematics, and Dr. Bernet S. Swanson, chemical engineering.

Berman came to Illinois Tech as an instructor in mathematics in July 1950, after receiving his bachelor of arts and master's and doctor's degrees from the University of Toronto, Canada, in 1947, 1948, and 1950, respectively.

He was awarded the Gordon Galloway medal for mathematics in 1943 and the Government of Ontario scholarship for general proficiency from 1943 to 1947.

Brenner, well known for displays and installations he has planned for the Museum of Modern Art in New York and the Merchandise Mart and Art Institute in Chicago, was appointed an instructor at IIT in September 1949.

He received his bachelor's degree in architecture at Columbia University in 1939, and his master's degree at Illinois Tech in 1949. In addition to teaching at IIT, Brenner has worked for several years with the architectural firm of Ludwig Mies van der Rohe.

Milbradt has been teaching at Illinois Tech since 1946. He received a bachelor's degree in mechanical engineering and a master's degree in civil engineering in 1945 and 1950, respectively, from IIT.

He served as an instructor at the Institute until 1951, when he was named assistant professor of civil engineering.

Struble was appointed assistant professor of mathematics at Illinois Tech in Sept., 1953.

He attended Iowa State College, then the University of Notre Dame for bachelor's master's and doctor's degrees in mathematics in 1947, 1949, and 1951, respectively.

In addition to instructing mathematics at Illinois Tech, Struble has performed research in the aerophysics section of Armour Research Foundation's propulsion and fluid mechanics department for the last three years.

Swanson received his bachelor's degree in chemical engineering in 1942, his master's in 1944, and his doctor's in 1950—all from Illinois Tech. He taught chemical engineering at Illinois Tech for three years, starting in 1944, then at Kansas State College during 1947-48.

He returned to Illinois Tech in 1948 as an instructor in chemical engineering.

* * *

Plans to expand The Babcock & Wilcox Company's Research Center in Alliance, Ohio, have been announced by Paul R. Grossman, research center director.

An "L"-shaped building will be erected at the Center to keep pace with growing nuclear engineering research activities being carried out by the company, according to Grossman. Reflecting the steady increase in other research projects, a two-bay addition will be made to the mezzanine of an existing structure, he said.

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WSE Applications

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

75-56 Vladdie V. Dvorak, Heating Contractor, Dvorak Heating & Engineering, 2536 S. Millard Av.

76-56 Richard C. Gern, Jr. Traffic Engineer, George W. Barton & Associates, 600 Davis St., Evanston, Ill.

77-56 Richard F. Graef, Vice President, Joseph K. Knoerle & Associates, Inc., 210 N. Calvert St., Baltimore 2, Md.

78-56 Frederick J. Stage, Supervisor of Equip. Engrs., Western Electric Co., Hawthorne Station.

79-56 Arthur C. Westrom, Director of Research & Develop., Hubbard & Co., 5401 W. Roosevelt Rd.

80-56 John I. T. Moloney, Sanitary Engineer, Pacific Flush Tank Co., 4241 Ravenswood Av.

81-56 Owen Bradley, Manager-Transp.-Traffic & Yard, Inland Steel Co., East Chicago, Ind.

82-56 William Fuerst, Design Engineer; Soiltest, Inc., 4711 W. North Av.

83-56 A. L. Small, Regional Engineer, American Institute of Steel Construction, Inc., 53 W. Jackson.

84-56 A. J. R. Houston, Chairman of Board, Midland Constructors, Inc., 222 W. Adams St.

85-56 Miss Annette Rieske, 5600 S. Richmond St.,—attending Illinois Institute of Technology.

86-56 Orville B. Tearney, Manager Credits & Corp. Ins., Inland Steel Co., 38 S. Dearborn St.

87-56 Walter A. Simon, Plant Engineer, Barrett Division, Allied Chemical & Dye Corp., 2800 S. Sacramento Av.

88-56 Albert Wigert, Jr., Field Engineer & Estimator, Wigert Construction Co., PO Box 64, Des Plaines, Ill.

89-56 Donald Botto, Engineering Field Rep., Goodyear Tire & Rubber Co., 141 W. Ohio St.

90-56 Glenn M. Reiter, Assistant Engineer, Illinois Bell Telephone Co., 212 W. Washington St.

91-56 John Ullrich, Engineer, The Peoples Gas Light & Coke Co., 122 S. Michigan Av.

Food Symposium

More than 200 food technologists and others in related fields are expected to attend the Symposium on the Future of Food Preservation, to be sponsored by Midwest Research Institute and held in Kansas City, Mo. at the Hotel Muehlebach on April 2-3.

William W. Niven, Jr., manager of the Institute's Chemical Engineering Division and chairman of the Symposium, has said, "This Symposium is unique because it will bring together in a single meeting people recognized for their outstanding knowledge on each of the various aspects of food preservation," Niven said. "In doing so, it will provide a composite picture of technical developments in all methods of food preservation. And it will interpret these developments in terms of their effects on the producer, distributor, and consumer."

Electronics Meet

The latest developments in electronic components will be reported in 43 technical papers and three luncheon addresses at the 1957 Electronic Components Symposium in Chicago on May 1-3.

More than 1,000 persons are expected to attend the three-day meeting at the Morrison Hotel, according to Dr. R. M. Soria, general chairman.

Technical papers will be given at seven sessions — introductory, components I, nuclear and environmental studies, components II, high temperature investigations and development, instrumentation and measurements, and materials.

Advance registration for all sessions and luncheons can be made by sending a check or money order for $15 to J. S. Powers, Arrangements Chairman, Electronic Components Symposium, 84 E. Randolph St., Chicago 1, Ill.

ASHAC Conclave

The Semi-Annual Meeting of the American Society of Heating and Air Conditioning Engineers will be held June 24, 25 and 26, 1957 in the Manoir Richelieu, Murray Bay, Quebec, Canada. with papers and 2 symposiums planned for the 3 day meeting.

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Group Objective is Military Plastics Use

Faster and more accurate development of military specifications calling for reinforced plastics is the objective of a newly formed committee of the Reinforced Plastics Division of the Society of the Plastics Industry, Inc., it has been announced in New York by Clare E. Bacon, of Owens-Corning Fiberglas Corp., chairman of the Division.

According to James Lunn of Lunn Laminates, Inc., and chairman of the new Military Specifications Committee, "It is the hope of the industry through this cooperative industry-government effort to achieve manufacturing economies and administrative efficiencies in the production of military requirements involving reinforced plastics. Formalization of the effort into a committee is the outgrowth of the reinforced plastics industry's realization of the problems of government in quickly and efficiently developing standards in a field that has experienced an increase of more than 1,750 per cent in production volume since 1945 and now numbers over 200 companies.

"The effort has the endorsement of the defense department," Lunn said, "and discussions with appropriate government agencies and plastics industry representatives have already begun. We hope to suggest ways in which present procedures and practices can be refined and integrated to expedite the formulation of realistic and representative specifications."

Lunn pointed out that the formation of this group is a reaffirmation of the reinforced industry's appreciation of the vital benefits to both government and industry that result from government-industry cooperation. The reinforced plastics radome enclosures and body armour of World War II days developed from just such liaison. Today the Armed Services uses for reinforced plastics are numbered in the hundreds. Besides radomes, for which reinforced plastics alone meet the requirements, military applications range from rockets to assault boats, landing craft, pipelines, airplane parts (225 in the F-84 *Thunderjet* alone), cases and containers of many types, arctic cargo sleds and shelters.

Members of this new Reinforced Plastics Division group headed by Lunn are key men in all phases of the industry.

John B. Alfers, Navy Dept., Bureau of Ships, Washington, D. C., has agreed to serve as a consultant to the Committee. The Committee is working closely with several representatives of the military on its study of the specifications problem.

They See the Light

From the small island off the southeastern tip of India comes word that Ceylon's Ministry of Industries has okayed the establishment of Ceylon's first light-bulb factory, reports *Electrical World*.

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Productivity Called Results of 3 Factors

The nation's wide margin of leadership in productivity can be attributed largely to three factors, a leading research official said in Chicago on Jan. 17.

The opinion was expressed by Clarence E. Watson, assistant director of Armour Research Foundation of Illinois Institute of Technology, at a luncheon meeting of the Kiwanis Club of Chicago.

Speaking on "Industrial Research—Key to Progress," at the Morrison Hotel, Watson cited these factors as:

1. Our system of free enterprise. "Under this system," he explained, "only those industries which are able to render the best product and the greatest service for the least cost can survive the long pull."

2. The recent upsurge in the art of good business management. "American business leaders are keenly interested in learning more about efficient business management, in training younger men to be good managers, and in investigating every new plan or device which will provide more efficient, lower cost operation, both in the plant and in the office," he stated.

3. The unprecedented rise of organized research and development. "The last 20 years have seen research and development grow from $175 million to more than $5 billion," Watson pointed out, "and over seven times a many dollars have been spent for research and development since 1936 as in the entire history of the United States prior to that year."

Increased research effort has enabled companies to avoid obsolescence, to outdistance competition, and to make greater profits, according to Watson.

"Research and development are necessary for continued industrial growth," he said, "and the more extensive the program the better the chances for success."

Referring to a recent study by a leading economist of the research and development expenditures of 11 industries, Watson pointed out that the industries which had spent the most for research and development also showed the greatest profit.

Those industries which had spent the least on research, also gained the least, the study revealed.

One of the best indications of the increased emphasis on research and development in this country is the rise of the independent, not-for-profit research institute, Watson stated.

"Organizations such as Armour Research Foundation, which provide scientific research to industry and government on a contractual basis, are unique and are not to be found elsewhere in the world," he said.

Only two such organizations existed in 1936, performing a combined research volume of a little more than $1 million, it was pointed out. Today, there are 48 such organizations with a total annual volume of about $100 million.

It is obvious, according to Watson, that research is paying its way by a wide margin. The National Science Foundation estimates that the United States has earned back $2,000 to $5,000 for every $100 spent for research and development in the last 25 years.

American business has, in scientific research, a built-in generator, he added.

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NLMA to Award Special Scholarships

The National Lumber Manufacturers Association will award special scholarships again in 1957 to outstanding college students majoring in wood technology or wood utilization.

At least four scholarships, and possibly five or six, will be awarded, depending on the number and qualifications of candidates.

Each scholarship will carry a cash payment of $500, travel expenses and ten weeks' on-the-job training in wood products research at the Washington, D.C., laboratory of the Timber Engineering Co., NLMA's research affiliate.

The scholarship program, begun in 1950, is designed to encourage more of the nation's top students to seek employment in the private wood industries. A majority of the students awarded past scholarships now hold such positions.

This year's scholarship winners will be chosen on the basis of their scholastic ratings, general aptitude and the recommendations of their schools. One senior or graduate student from each college and university offering a course in wood technology or wood utilization is eligible for nomination by his dean.

NLMA offers employment assistance to students who complete this course.

Cable Capers

The electrical load on an island in Gull Lake, northeast of Kalamazoo, Mich,. reached the point where the cable serving it had to be replaced, but the lake was frozen over. The new cable was winched across the ice. A trench 12 inches deep was cut in it from the mainland to the island, and the cable was dropped along it, reports *Electrical World*. The heavy cable broke through the remaining ice and sank to the bottom.

Big Noise

At Lakeside, Utah on Nov. 20, the third largest non-atomic explosion was set off according to *Engineering News-Record*. More than 600,000 pounds of explosives were used to provide almost 1.5 million tons of rock for the Southern Pacific Railroad's $49-million crossing of Salt Lake.

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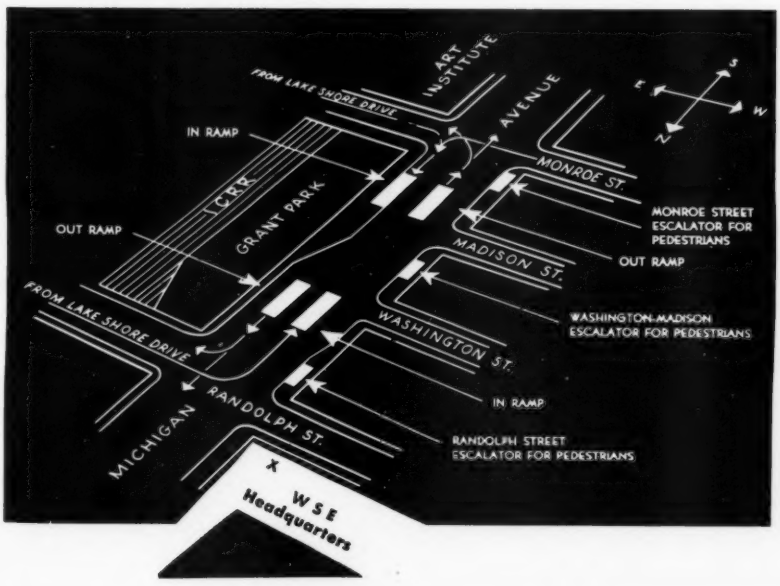
Do you like to DRIVE?

Then why not drive to WSE meetings and other functions? There's plenty of PARKING almost at the door—the Underground Garage is diagonally across the street from WSE Headquarters (see the map below), two private garages are a block west, and the State-Wacker "Bird Cage" Garage is only a short distance away.

Below: map showing Park Department Underground Garage



Interior view of Underground Garage

If you're not driving it's still convenient to get to and from WSE meetings.

Here are handy stations or stops:

- The Cab Stand is just across the street
- The Elevated is one block west
- The Subway is two blocks west
- Buses stop at the door or within a few blocks for every part of town
- The IC Suburban station is across the street
- Other suburban stations are conveniently served by bus or elevated.

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Engineering News from Commonwealth Edison

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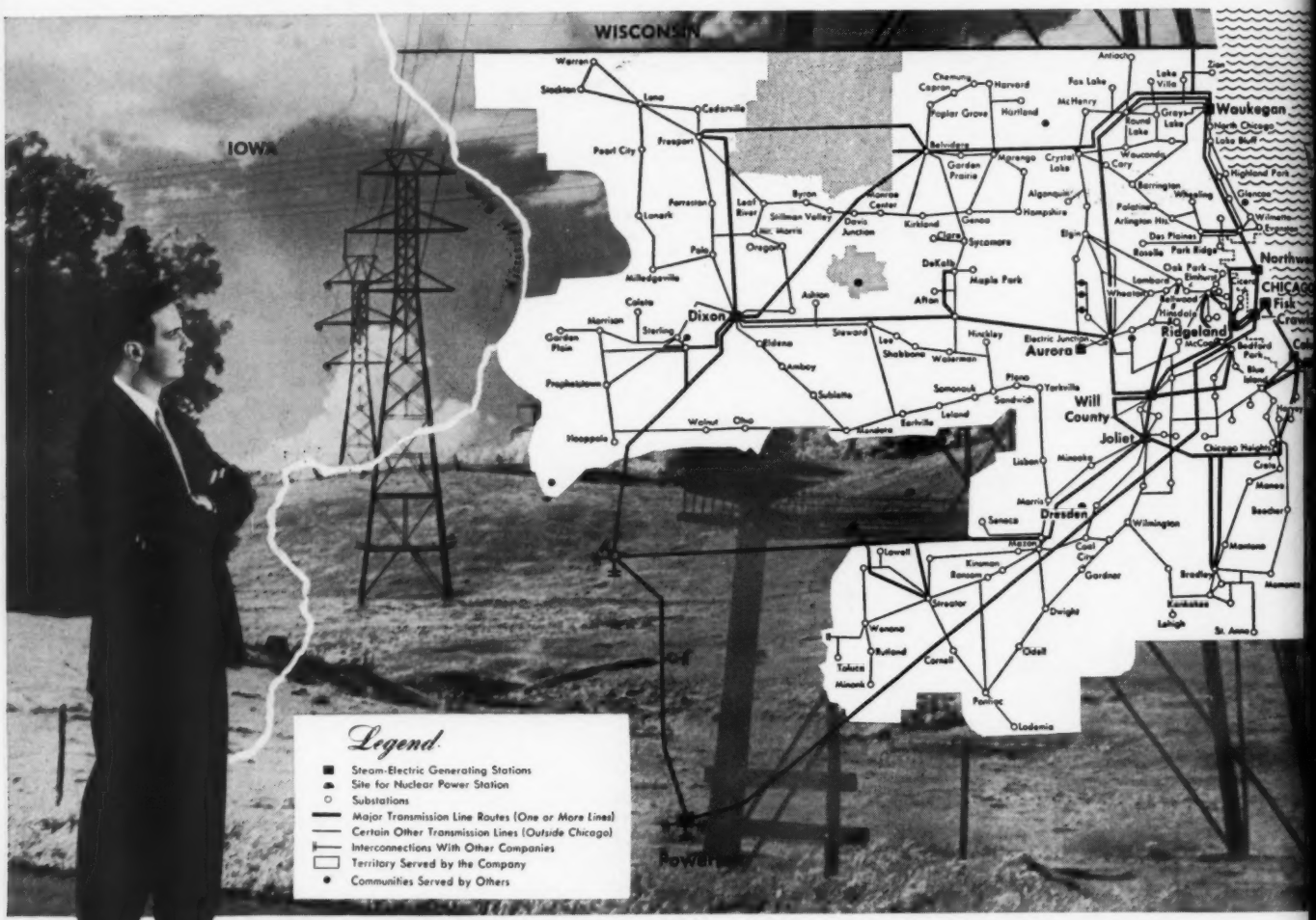

Engineer Gerald Quaid surveys territory in Northern Illinois served by the Commonwealth Edison System.

Here is a challenge—an engineering challenge worthy of any young engineer's ambitions and talents. Forecasts indicate that demand for electric power will about double in the next 10 to 12 years. In this short period, the generating, transmission, and distribution capacity developed over the past 75 years must also be substantially increased.

This is a large order. But the real challenge to the engineer, in these days of increasing costs, is meeting this need while maintaining present high quality, low cost service.

Need more reasons to become interested in the electric power industry? Here are a few:

- It is a dynamic and fast growing industry.
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- It is still in the developmental stage. Applications such as electronic computers, microwaves and nuclear technology are on the increase.
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